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STEP

AUTHOR: (8) Kvyatkovskaya, G.V., Engineer

TITLE: (6) CXJ (SKhL) grade steel, reduced with an increased amount of titanium

PERIODICAL: 'Stal', no. 12, 1962, 1121 - 1,122

TEXT: At the Kuznetskiy metallurgicheskiy kombinat (Kuznetsk Metallurgical Combine) tests were carried out to produce SKhL grade steel with a higher titanium content. The conventional (A) and experimental (B) steel compositions were (by %):

	C	Mn	Si	Cr	Cu	Ti	Ni	P	S
A:	0.11	0.65	1.00	0.75	0.55	traces.	0.65	0.04	0.04
B:	0.11	0.69	0.94	0.81	0.43	0.01	0.56	0.031	0.035

2 kg of ferrotitanium per 1 ton of liquid steel were added to the conventional grade and 3 kg/ton to the experimental grade. Both steels were rolled into strips 7 - 10 mm thick and subjected to the normal mechanical tests, yielding the following results:

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SKhL grade steel, reduced with an increased

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	$\sigma_s, \text{kg/mm}^2$	$\sigma_B, \text{kg/mm}^2$	$\delta, \%$	HB
A	$\frac{39.7}{48.5}$	$\frac{55.0}{63.8}$	$\frac{22.7}{18.4}$	$\frac{168}{187}$
B				

The above results show that the test steel had a higher hardness and a lower ductility. After annealing for 5 h in the 100 - 700°C range, the mechanical properties of the conventional grade had improved slightly, while those of the test grade were unchanged. Structural investigations with an optical microscope did not reveal any difference between the two grades. However, examination with an electron microscope showed the test steel to have an acicular structure with a well-defined orientation after rolling. In the conventional steel (when heated to 400°C) the intergranular boundaries become thicker, take up the shape of double lines, clearly marking the grains. The test steel structure did not change when annealed at 100 - 500°C. When annealed at 600 and 700°C, the two grades became identical in structure (ferrite and granular pearlite). The acicular structure increases the strength, but decreases the toughness and ductility of the steel. Therefore, in reducing the SKhL grade, not more than 2 kg/ton Ti should be used, to prevent the formation of an acicular structure and its effects.

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There are 2 figures.

ASSOCIATION: Kuznetskiy metallurgicheskiy kombinat (Kuznetsk Metallurgical Combine)